BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

IN RE: APPLICATION 96-1	**)**	
	)	
of	**)**	**EXHIBIT NO. KDN-3**
	)	
OLYMPIC PIPELINE COMPANY	**)**	
	)	
CROSS-CASCADE PIPELINE PROJECT	**)**	
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DESCRIPTION:	**PHOTO & NARRATIVE EXHIBIT TO KURT D. NELSON'S PREFILED DIRECT TESTIMONY**
EXHIBIT NO.	**KDN-3**

Narrative Statement
Accompanying Exh. KDN-3

The photos in this **Exhibit KND-3** illustrate the impacts to stream channels from mass wasting processes common to the Pacific Northwest and the removal of trees and riparian vegetation along stream banks. The mass wasting processes shown in the photos have been documented to occur along the pipeline route. By showing the different forms of mass wasting processes, I am attempting to illustrate the dynamic nature of landscapes and stream channels in western Washington. The siting of the pipeline and the design of the pipeline (e.g. scour) must take into account the potential that these landslides will occur. In addition, these photos provide evidence to support the concern that mass wasting activity can potentially damage the pipeline, causing a pipeline rupture or leak. It should also be noted these mass wasting processes are closely associated with streams where fish and other aquatic resources are located.

Mass Wasting Processes Common to the Pacific Northwest.

Photo 1: This is a photo taken of a deep-seated landslide (Deforest Creek slide) in the Stillaguamish watershed. The landslide occurred catastrophically in 1984, and has been attributed to a stream eroding the base of it and the removal of timber from the landslide itself. Between 1984 and 1991 this landslide delivered 1.6 mil cubic meters of sediment to Deer Creek, which resulted in channel widening, loss of pools, and has been attributed to significant declines in steelhead production.

Photo 2: This is a photo looking into the Deforest Creek slide.

Photo 3: This is a photo from the toe of the slide looking down Deforest Creek into Deer Creek, in the background.

Photo 4: This is a photo of a shallow landslide in Quartz Creek, in the Skagit Watershed. The removal of trees on steep banks adjacent to streams is a principle factor that causes shallow landslides. Notice the chronic surface erosion on the left bank. Control of surface erosion at locations such as these will be difficult.

Photo 5: This is a photo near the mouth of Quartz Creek, on its alluvial fan. This photo presence evidence of the dynamic nature of stream channels on alluvial fans. It also provides evidence in support of concerns about scour. Notice the root growth on the cottonwood. It tells a story of sediment deposition and channel incision. The lower roots are the original base of the tree. The higher roots grew after sediment deposition occurred. Subsequent to the deposition, the original roots were re-exposed. If a pipeline was built over this creek during a period of high sediment deposition, using the proposed trenching methods, the pipeline would have been exposed by the time this photo was taken.

Photo 6: This is a photo of Huckleberry Creek, on the Deschuete River in Washington state, after a type of debris torrent occurred. This section of stream is near the origin of the debris torrent. Notice the bed and bank scour that occurred. This stream is approximately the same size as many of the streams crossed by the pipeline.

Photo 7: This is a photo of Huckleberry Creek, downstream of the previous photo. Notice how much larger of an area was scoured. The channel size at this point in the drainage is approximately

the same size as Griffin Creek. Tributaries to the South Fork Snoqualmie are prone to this type of landslide event.

Photo 8: This is a photo another photo of Huckleberry Creek, downstream of the previous photo, where the large woody debris and sediment in the debris torrent deposited.

Photo 9: This is a photo taken at the trestle on Hall Creek, on the South Fork Snoqualmie River. The debris torrent that occurred on Hall Creek scoured the stream channel and also destroyed the mid-span of the trestle. The impact of the debris torrent bent the girder shown in the photo.

Potential Channel Response to the Removal of Trees from the Riparian Zone.

Photo 10: This photo was taken in Walker Creek, a stream within the Skagit Watershed. This section of stream had an intact riparian zone dominated by trees. The stream at this point had a channel width of 12 meters, and had a high frequency of pools and percent pool area.

Photo 11: This photo was also taken in Walker Creek. This section of stream flows through a powerline corridor, approximately two to three hundred meters upstream of the section of stream shown in Photo 10. Channel width in this section of stream was 19 m. The principle reason for the wide channel at this point is due to the lack of riparian vegetation, which stabilizes streambanks and reduces erosion. The habitat in the channel was very poor, as indicated by few pools, shallow pool depths, and few pieces of large woody debris.